of his balance is not excessive, and that in practice it will safely indicate the millionth of a grain.

One observation of the weight of sunlight is given; it was taken on December 13; but the sun was so obscured by thin clouds and haze that it was only equal to 10·2 candles 6 inches off. Calculating from this datum, it is seen that the pressure of sunshine is 2·3 tons per square mile.

The author promises further observations with this instrument, not only in photometry and in the repulsion caused by radiation, but in other branches of science in which the possession of a balance of such incredible delicacy is likely to furnish valuable results.

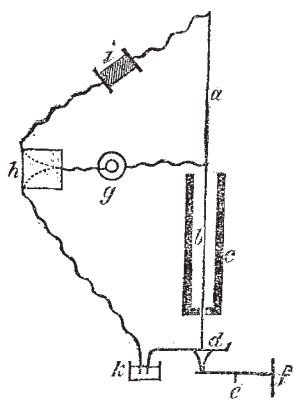
SCIENCE IN GERMANY

(*From a German Correspondent.*)

A FEW years ago Edlund attempted to decide the question whether the galvanic current is capable of directly altering the volume of a conductor through which it flows, or not, *i.e.*, whether changes of volume were demonstrable that were independent of the heat produced in the conducting wire? The results of his experiments appeared to furnish an affirmative answer to this question. More recently, Streintz published an investigation, the result of which was a confirmation of Edlund's view on the expanding power of the galvanic current. The expanding action found by Edlund was from 2·8 to 6·5 per cent. of the action of the heat simultaneously produced; that found by Streintz was considerably greater. In soft iron it amounted to 27 per cent. of the action of the heat.

From the fundamental importance which attaches to this question, in relation to the theory of galvanism, and from the difficulty of demonstrating the volume-changes referred to, apart from the actions of the heat simultaneously produced, it was desirable that the subject should be investigated by a method as free from error as possible. Such an investigation has lately been carried out by Herr Exner, in Vienna. The essential points of his method are as follows:—

Two pieces, *a* and *b*, of the same wire, about equally long, were suspended vertically one over the other, as indicated schematically in the figure. The lower piece, *b*, passed centrally through a glass tube, *c*, which was quite open above, but closed below with a cork, which merely gave passage to the wire *b* by a short glass tube



(2mm. wide) inserted in it. From the lower end of the wire *b* hung the plate *d* for holding weights. This was furnished at its base with a sharp iron point, meant to act on one arm of a lever which could be turned about *e*, while the other arm bore the mirror *f* at right-angles to its axis, and so in a vertical plane. If the image of a vertical scale were observed in this mirror with a telescope, the least change in length of the wires *a* and *b* could thereby be perceived. From the point of connection between *a* and *b* a wire was connected with the battery *g*. The other pole of the battery was connected with the commutator *h*, and thus the current could be sent either through the rheostat *i* to the suspending point of the wire *a* and through the latter back to the battery, or on the other side to the mercury cup *k*, in which is dipped the bent end of a short copper wire soldered to the plate, *d*, establishing thus a conductive connection between the commutator *h* and the wire *b*. Through the latter the current then went back to the battery. One could thus easily send the current successively through each of the two wire-pieces, *a* and *b*, separately, and so observe the elongation experienced by each. Since, as has been said, the two pieces *a* and *b* were not exactly equal in length, their elongations were also not exactly equal; to make them equal, the rheostat *i* was inserted, by which the resistance in the circuit *g h i a g* was so regulated, that with unchanged battery the successively observed elongations of *a* and *b* were the same. Water was now allowed to pass through the glass tube *c*, in order to take away as much as possible of the heat produced in the wire *b* by the galvanic current. If, now, the current passed through *b*, only the elongation which might occur independently of the heat action of the current would be observed, the heat produced being removed by the flowing water.[1] If, however, the current passed through *a*, both an elongation produced in *a* through direct action of the current, and the elongation through action of heat would be observed at the same time. [These experiments might of course also be made with only one piece of wire, *e.g.* *b*. The second piece *a*, serves only for making the obvervations more quickly in succession.]

It was found that the galvanic expansion expressed in percentage of the heat-expansion was only about 1·2 to 2·2 per cent.; and no connection was recognisable with the nature of the metal employed. If it be considered that these values, of course, can only be an upper limit, it will follow from the smallness of the effect obtained that there is no sufficient ground for the hypothesis of a special expansion-power of the galvanic current. There can hardly be any doubt that the slight expansion which the water-inclosed wire still shows is simply and alone due to the heat remaining in it. W.

THE INTERNATIONAL METRIC COMMISSION AT PARIS

IN previous numbers of NATURE[2] some information has been given of the proceedings of the International Metric Commission of Paris, and of the progress of their work in providing new international standards of the metric system. The construction of the new standard metres and kilogrammes of platinum-iridium, which was entrusted to the French section of the Commission, is now approaching completion, and their comparisons with the old standards of the Archives and with each other will probably be commenced early this spring.

It has been already explained that the definitive verification of the new standards was entrusted by the Commission to a permanent committee of twelve of their members, each representing one of the principal civilised countries interested. For the purposes of providing the committee with the necessary means of exercising their duties, and of giving an authoritative international character to the new standards, and to the regulations to be adopted for the custody and use of the new international metric prototypes, a diplomatic conference was held at Paris in March 1875, when a convention was entered into for effecting these objects.

Papers relating to the meeting and proceedings of this diplomatic conference, drawn up by Mr. Chisholm, the Warden of the Standards, who was the representative of

[1] It may happen that the heat of the wire is not entirely carried off by the flowing water.

[2] Vol. vii. pp. 197 and 237; vol. viii. p. 403; vol. x. p. 130.